



Typical Applications

- Low cost signal generators
- Test equipment
- Communication systems
- EW systems
- UHF/VHF systems
- Radar systems
- Frequency conversion
- OEM integration into RF systems

Features

- Wideband RF output, 138 MHz to 4.4 GHz
- Integer and Fractional operating modes
- Pout: +10 dBm typical, with up to 31 dB of attenuation with optional output attenuator
- USB interface
- USBTMC VISA Compliant
- User selectable internal reference or externally applied reference

General Description



The AR2010 RF synthesizer series from Applied Radar, Inc. offers a low cost solution to today's demanding RF signal generation needs.

The AR2010-4400 RF Synthesizer Module is a low-cost, wideband 138MHz to 4.4 GHz frequency synthesizer ideally suited for bench top test and measurement as well as low-cost small form-factor radar and communications systems. Its wide output frequency range, superb spurious rejection, and excellent phase noise performance provide a high-quality, low-cost alternative to bench top RF signal generators. An internal reference allows the unit to operate without any external components, but also has an input for an external reference.

The synthesizer module is powered and controlled directly by a host PC through USB. The AR2010-4400 is VISA compliant, enabling seamless cross-platform use.

The USB stick design is small enough to even fit in your pocket!

Electrical Specifications

| Parameter | Min. | Typ. | Max. | Units |
|---|------|------|------|--------|
| RF Operating Frequency | 138 | - | 4400 | MHz |
| RF Output Power No attenuation | 6 | | 14 | dBm |
| Reference Input Frequency (Sine) | 5 | 10 | 100 | MHz |
| Reference Input Power (Sine or square wave) | 0 | | 15 | dBm |
| RF Phase Noise: 200 MHz | | -117 | | dBc/Hz |
| (100 kHz Offset) 2000 MHz | | -108 | | dBc/Hz |
| 4000 MHz | | -103 | | dBc/Hz |



Electrical Specifications (continued)

| Parameter | Min. | Typ. | Max. | Units |
|---|--------------|-------|------|-------|
| RF Output Power Ranges: 200 MHz | -18 | | 10 | dBm |
| 2000 MHz | -16 | | 14 | dBm |
| 4000 MHz | -21 | | 10 | dBm |
| RF Harmonics | (See graphs) | | | |
| Locking Time | | 500 | | us |
| Frequency Resolution:* Integer Mode | | 10 | | MHz |
| Fractional Mode | | 2.441 | | kHz |
| Power Resolution | | 1 | | dB |
| Internal oscillator frequency stability | | ±2.5 | | ppm |

*For a 10 MHz reference input.

Integer and Fractional Modes of Operation

The AR2010 RF Synthesizer Module is capable of operating in integer or fractional mode. When in integer mode, the frequency resolution of the Synthesizer Module is calculated using equation (1):

$$f_{res} = \frac{Reference}{Reference\ divider} \quad (1)$$

Fractional mode will allow for a frequency resolution of 2.441 kHz at a 10MHz reference frequency. Lowering the reference frequency will improve frequency granularity but will degrade phase noise performance. Raising the reference frequency will degrade the frequency granularity but will improve phase noise performance.

In general, integer mode will exhibit better phase noise and spurious performance than fractional mode across the synthesizer's entire frequency band. It is recommended to use integer mode over fractional mode whenever possible.

Frequency Reference Consideration

Aside from reference divider considerations, the phase noise performance and stability of the reference oscillator is closely related to that of the RF Synthesizer Module. It is important to choose an accurate and stable reference in order to ensure the best possible performance of the AR2010. The AR2010-4400 comes with an internal reference for operation without the need of an external reference. However, phase noise can be improved with a more stable external oscillator.

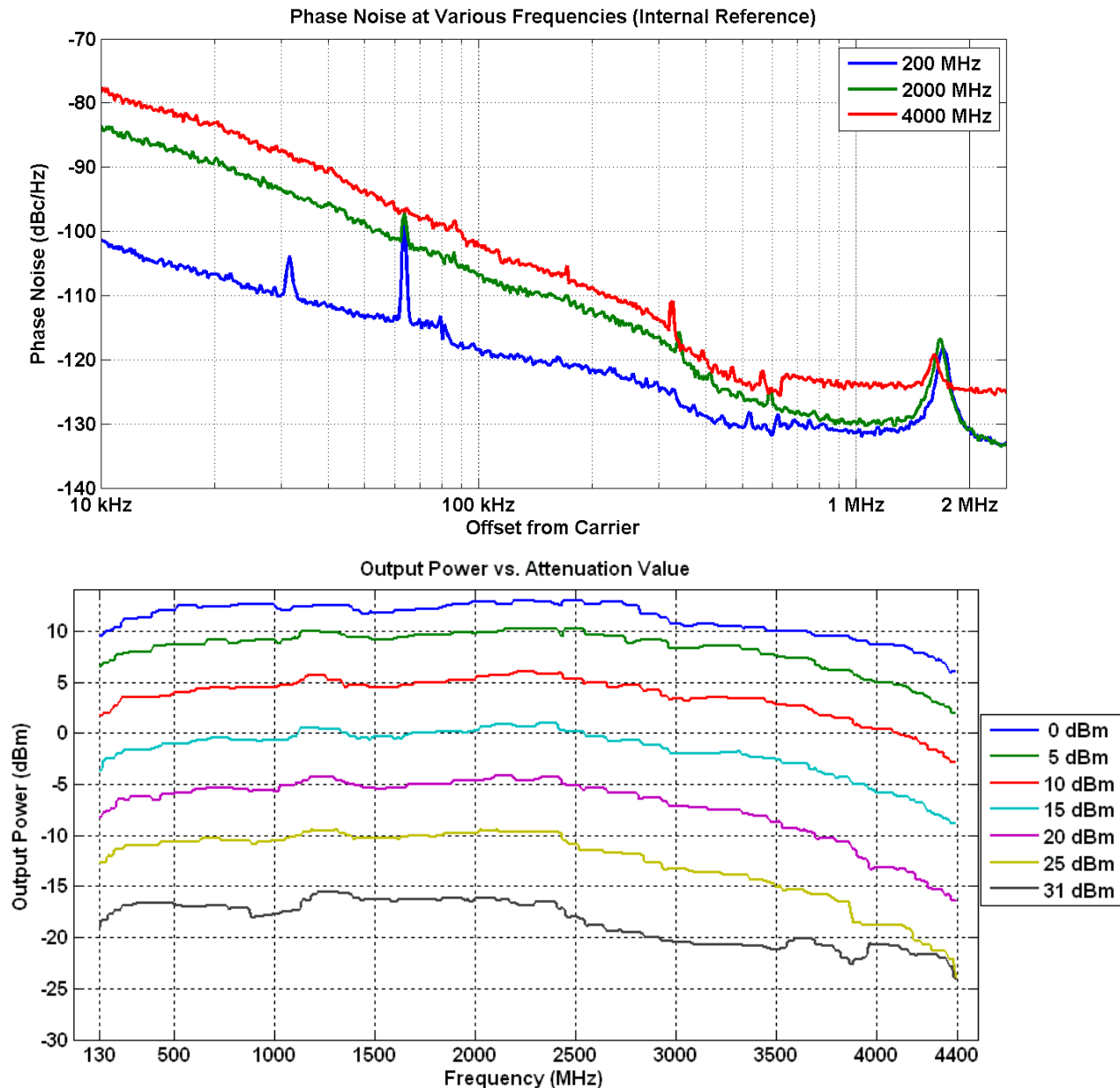
Programming Interface

This module can be controlled using any computer with a USB port running the Windows, Macintosh, or Linux operating systems. Other configurations may be possible since the synthesizer uses the USB Test and Measurement Device (USBTMC) class standard to emulate a GPIB bus. This enables it to easily interoperate with an existing test equipment setup. A Windows compatible USBTMC driver is supplied with the module. Most newer distributions of Linux already have USBTMC drivers included in the kernel, and Macintosh users will need to obtain drivers from a third party. Installation of drivers is not necessary if you already have a compliant VISA runtime installation, such as one provided by National Instruments or Agilent. A demonstration interface program using the VISA runtime is provided with the module.



The module is controlled by delivering text-based commands to it through the USB interface. The structure of this command language is compliant with the SCPI 1999.0 standard and is detailed in the programming manual associated with this device. For further information on programming the AR2010 RF Synthesizer, see the USB Programming manual (AR2010-99-2).

Frequency Synthesizer Performance Plots*

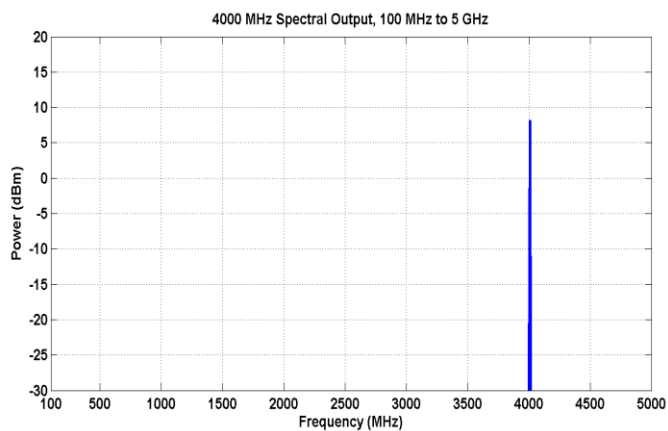
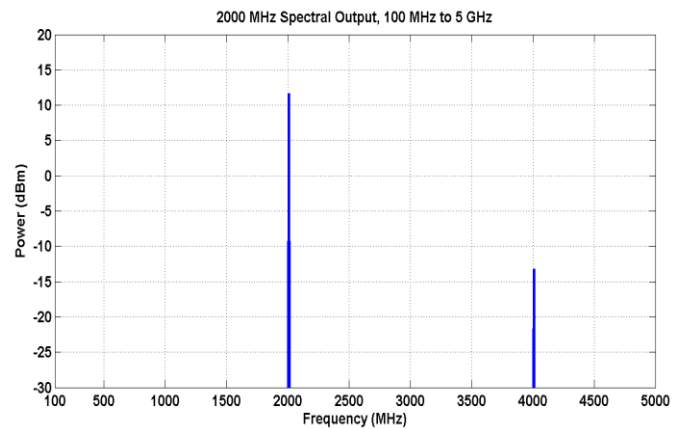
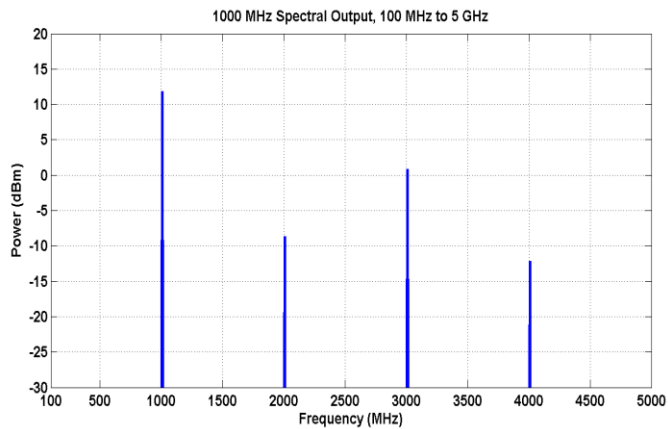
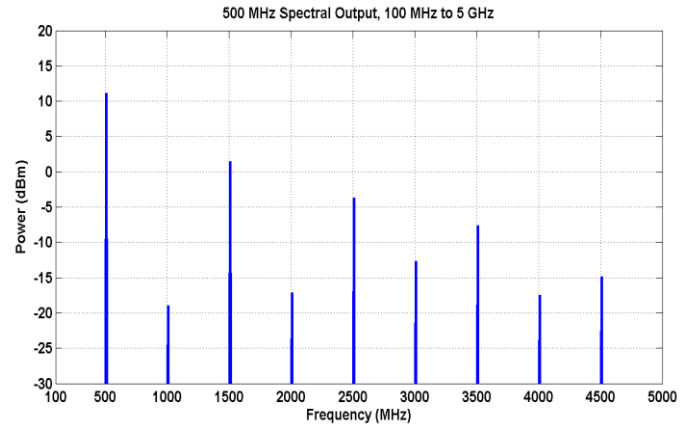
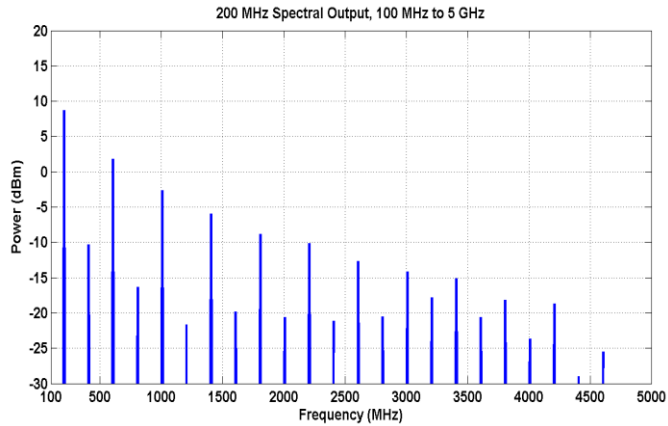


*Using the internal frequency reference

For price, delivery, and to place orders, please contact Applied Radar:
315 Commerce Park Road, North Kingstown, RI 02852 Phone: 401-295-0062 Fax: 401 667-2912



Spectral Plots





Associated Products

| Product Number | Description |
|----------------|-----------------------------|
| AR2000 | Reference Oscillator Module |

Options

The following options are available with the AR2010-4400:

| Option Code | Description |
|-------------|-------------------|
| 100 | Output Attenuator |

Absolute Maximums

| | |
|-----------------------|----------------|
| Ref input power | +20 dBm |
| Vcc | +6 Vdc |
| Operating Temperature | -40 to +85 °C |
| Storage Temperature | -55 to +125 °C |



ELECTROSTATIC SENSITIVE DEVICE
OBSERVE HANDLING PRECAUTIONS

Ordering Information

AR2010-4400